TECHNICAL REPORT

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# Biomimetics — Image search engine



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# Foreword

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This document was prepared by Technical Committee ISO/TC 266, *Biomimetics*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

# Introduction

Biomimetics is the science and technology that develops new technologies by using ideas learned from observation and analysis of structures, functions, and production processes of living organisms or utilizes them in manufacturing. The term “biomimetics” was first used in the 1950s by the American neurophysiologist, Otto Schmitt.

From ancient times, humans have manufactured mimicking forms and structures that living organisms have and functions expressed by them. It is a well-known story that Leonardo da Vinci conceptualized flying machines through precise observation of birds in the Renaissance period. In the early eighteenth century, the French engineer Marc Brunel designed shield tunnelling, inspired by the observation that a shipworm uses its secretion to bore through timber and push the sawdust out behind it. Recently, shark skin-patterned high-speed swimwear has been developed, inspired by the skin texture of a shark to reduce water resistance. A mosquito inspired Seiji Aoyagi of the Faculty of Engineering Science, Kansai University, Japan, to develop a “microneedle” that reduces pain during a vaccination. These are all examples of biomimetics and how living organisms successfully resolve the challenges of manufacturing products or technologies. However, the relations between biology and engineering in these successful examples owe much to the abilities of the people behind the research. In recent years, informatics represented by big data or artificial intelligence has made remarkable progress and allows a large amount of texts or images to be analysed, was more difficult before due to the performance of computers. Therefore, the use of informatics will allow us to consider possibilities of various combinations beyond the abilities of humans. This also greatly enhances the possibility of biomimetics (see Figure 1).

# Biomimetics — Image search engine

## 1 Scope

This document describes prototypes of the image search engine (ISE). It focuses on the use and value of ISE, but also describes its design principles.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/TR 23845, *Biomimetics — Ontology-Enhanced Thesaurus (OET) for biomimetics*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 23845 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

**3.1**
**data**
minimum piece of information that is meaningful for its potential reader or user

Note 1 to entry: In many cases, data is a component of a larger entity, a data set or a database. Data can be text, e.g. research papers, simulation models, algorithms, numbers, pictures, figures, voice and video recordings.

**3.2**
**database**
set of almost any digital objects, e.g. text, picture, sound, video

**3.3**
**image retrieval system**
computer system used for browsing, searching and retrieving images from a large database of digital images

**3.4**
**data retrieval**
action of obtaining data from a Database Management System (DBMS) such as an Operational Database Management System (ODBMS)

**3.5**
**ontology**
formal, structured, and explicit description of concepts in a domain of discourse and the relations between them in the fields of knowledge management and artificial intelligence

Note 1 to entry: An ontology together with a set of individual instances of classes constitutes a knowledge base.